MFT

PERSONAL FITNESS

Lesson 7

Personal Fitness: Lesson 7

- Review lesson 6 and homework
- LO #1: CR fitness; O_2 delivery/ CO_2 removal
- LO#2: adaptations to CR training
- LO#3: training in extreme climates
- Review

LO #1: O_2 Delivery / CO_2 Exhaust

1. Left ventricle - pumps O_2-rich blood to arteries
2. Arteries - deliver O_2-rich blood to capillaries
3. Capillaries - allow O_2 (out)/CO_2 (in) exchange at cells
   - deliver O_2-poor/CO_2-rich blood to veins
4. Veins - return O_2-poor/CO_2-rich blood to heart
5. Right ventricle - pumps O_2-poor blood through lungs' alveolar capillaries
6. Alveolar capillaries
   - allow CO_2 /O_2 exchange
   - deliver O_2-rich blood to heart

LO #1: CR Endurance / VO_2max

Definition: The ability to deliver and use O_2 to meet the energy demands of prolonged physical activity.

Measurement:

Research: gas analysis during exercise on

- Treadmill
- Cycle ergometer

Field use: estimates from correlation equations

LO #1: CR Endurance / VO_2max

Units: which are more meaningful? Why?

<u>Absolute</u> - expressed as l/min

<u>Relative</u> - expressed as ml/kg-min^{-1}

Males: VO_2max (ml/kg*min) = 99.7 - (3.35 x t_{run})

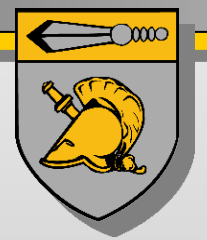
Females: VO_2max (ml/kg*min) = 72.9 - (1.77 x t_{run})

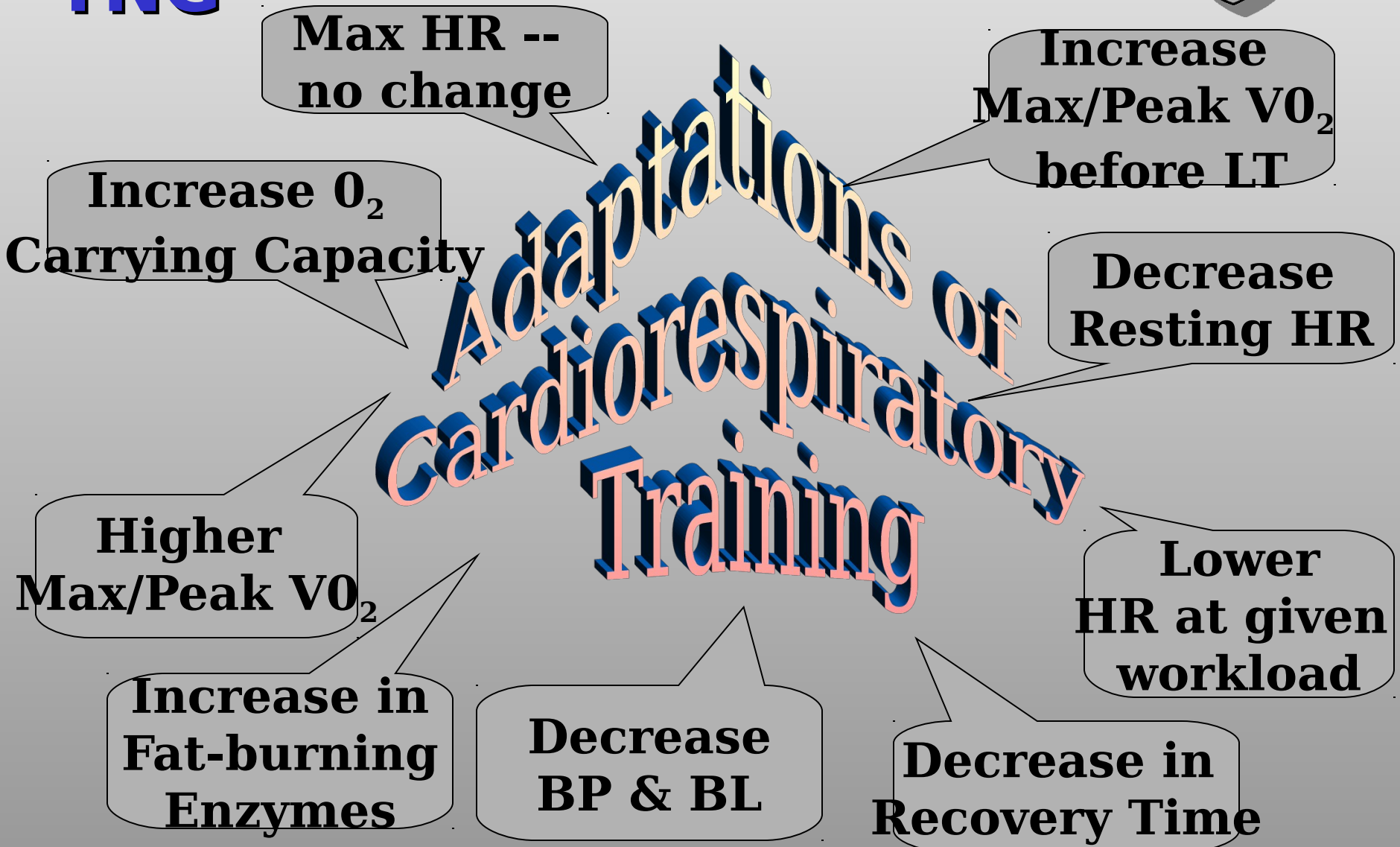
<u>Note</u>: t_{run} is expressed in decimal-form minutes

LO #2: Cardiac Output (CO)

CO		SV		HR
Blood pumped in one minute (l/min)	=	Blood ejected by the heart in one beat (ml)	×	Number of beats per min. (beats/min)
5.04 Untrained		70		72
5.04 Trained		84		60

LO #2: Adaptations to CR TNG




Max HR -- no change
Increase Max/Peak VO_2 before LT
Increase O_2 Carrying Capacity
Adaptations of cardiorespiratory Training
Decrease Resting HR
Higher Max/Peak VO_2
Lower HR at given workload
Increase in Fat-burning Enzymes
Decrease BP & BL
Decrease in Recovery Time

LO #3: Training in Heat

HEAT

Evaporation

Conduction

Acclimate

Fluids

Convection

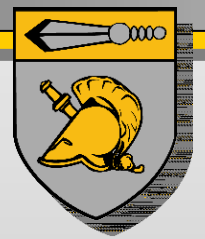
Avoidance

Radiation

Reduced work capacity

Decreased blood flow to working muscles

LO #3: Training in cold



Fluids

Layers

Frostbite

Hypothermia

COLD

Avoid profuse sweating

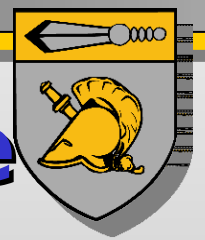
Heat injury

Avoid wind chill

Body temp ↓

Blood flow to vital organs ↑

LO #3: Training at Altitude



Training

Acclimation

PP of O2

↑ Red blood cells

ALTITUDE

↓ Work capacity

↑ Total Blood volume 20-30 days

↓ Blood plasma

↑ Red blood cells

Chronic - Black, Acute - Red

Review

1. What is the two-fold function of the CR system?

2. Calculate the following for Cadet Jones:

   (a) CO (l/min) Given: SV = 75 ml; HR = 140

   (b) SV (ml) after training Given:

   same work output as in (a); HR = 125

3. CR endurance is the ability to _____ and ____ O_2 to meet energy demands for prolonged exercise.